ADVISORY DEPARTMENT
OF THE IMPERIAL COLLEGE OF
TROPICAL AGRICULTURE.

IMPERIAL MYCOLOGICAL
3 SEPT. 1934
INSTITUTE

REPORT

ON THE

AGRICULTURAL DEPARTMENT

DOMINICA.

1933.

ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE.

1934.

[Price Sixpence.]

PRINTED AT THE BULLETIN OFFICE, ROSEAU, DOMINICA, B W I.

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LETTER OF TRANSMITTAL.

C. A. 442/34.

TRINIDAD,
11TH APRIL, 1934.

SIR,

I have the honour to submit a Report of the Agricultural Department of Dominica for the year 1933.

2. In the Botanic Gardens, several improvements have been made in the Decorative Section, and the work involved in remodelling the Economic Section has progressed favourably.

3. The propagation and distribution of economic plants has again been conducted on a large scale. As the amount of new land suitable for lime cultivation in Dominica is now somewhat limited, the tendency has been to reduce the output of budded lime trees and to pay more attention to the production of greater numbers of first rate quality grapefruit and orange trees. In accordance with the findings of the West Indian Fruit Conference held in Jamaica in October 1933 it has been decided that in view of the serious decrease in demand for concentrated and raw lime juice, the propagation of lime trees will be restricted further during 1934.

4. Experiments to determine the possibilities of top working budded lime trees with grapefruit are in progress, so that in the event of a further reduction in the price of lime products, it is hoped that a quick method of converting lime trees into grapefruit trees will be available.

5. Efforts to produce a variety of lime possessing the good qualities of the West Indian lime combined with resistance to withertip disease were continued. The importance of this work has recently been augmented by the knowledge that under present conditions the growing of Woglum or Philippine limes in withertip areas would be unprofitable, firstly because of the collapse of the market for juice, and secondly because the essential oils obtained from these two varieties have been reported by the Imperial Institute as being definitely inferior to the oil of the West Indian lime.

6. The exports of oranges, grapefruit, and bananas have been considerably increased, and in view of the areas under these crops having been greatly extended during the last three or four seasons, exports are likely to increase rapidly during the next few years.

7. The officers of the department are doing excellent work in the difficult task of training pupils. The courses include lectures and practical work in general agriculture, and in the propagation of citrus. Seventy-seven lectures were given, and the average attendance of pupils was eighteen. There appears to be considerable competition among candidates wishing to take the courses when vacancies arise.

8. The activities of the Government Marketing Depot continue to grow, and during 1934 the Depot will undertake much of the work which has recently been performed by the Peasants' Information Bureau. MR. SHILL, the Marketing Officer transferred his headquarters to St. Lucia at the beginning of the year, but the Depot still benefits from the valuable assistance which he renders during his frequent visits to the island.

9. Mr. H. B. PIDDUCK, Assistant Agricultural Officer, Northern District spent the Michaelmas term at the Imperial College of Tropical Agriculture for the purpose of taking a Refresher Course.

I have the honour to be,

Sir,

Your obedient Servant,

G. A. JONES,
Commissioner of Agriculture.

His Honour
The Administrator.
DOMINICA.

AGRICULTURAL DEPARTMENT,
DOMINICA, B. W. I.
20TH MARCH, 1934.

No. 85.

SIR,

I have the honour to submit a report on the work of the Agricultural Department, Dominica, for the year 1933.

I have the honour to be,

Sir,

Your obedient Servant,

F. G. HARCOURT,
Agricultural Superintendent.

The Commissioner of Agriculture,
Advisory Department,
Imperial College of Tropical Agriculture,
TRINIDAD, B. W. I.

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AGRICULTURAL DEPARTMENT, DOMINICA.

STAFF.

F. G. HARCOURT	Agricultural Superintendent and Curator, Botanic Gardens.
H. B. PIDDUCK	Assistant Agricultural Officer, (Northern District.)
W. E. BASSETT *	Assistant Agricultural Officer.
A. C. WINSTON	Travelling Agricultural Instructor.
G. R. COOLS-LARTIGUE	Clerk.
C. M. ALEXANDER	Foreman.

GOVERNMENT FRUIT FARM.

S. A. SCHOUTEN *	Assistant Agricultural Officer.
L. OSCAR *	Foreman.

PEASANTS' INFORMATION BUREAU AND GOVERNMENT MARKETING DEPÔT.

E. E. TAYLOR *	Officer-in-Charge and Chief Fruit Inspector.
G. A. WINSTON	Clerk.
J. J. MCDOWELL	Foreman and Fruit Inspector.

* Temporary appointments.

REPORT ON THE AGRICULTURAL DEPARTMENT,

DOMINICA.

For the Year ended 31st December, 1933.

THE BOTANIC GARDENS.

The Decorative Section of the Botanic Gardens was maintained in an attractive condition throughout the year. The Main Drive was metalled, and the short road approaching the Curator's Office widened. Special attention was again paid to the pruning and shaping of trees and shrubs, and some of the strong growing woody climbers which threatened to kill the trees supporting them were removed or considerably restricted.

A number of old and somewhat unsightly palms were cut down and replaced by groups of young plants of similar species. Other plantings included *Cassia multijuga* grouped with *Berria Ammonilla*, and beds or specimens of *Cannas*, *Cassia nodosa*, *Oxalis dispar* and *Thunbergia erecta* var. *alba*.

Most of the ornamental flowering trees and shrubs flowered well during their respective seasons, plants giving especially lengthy or interesting displays being *Spathodea campanulata*, *Butea frondosa*, *Lysidice rhodostegia*, *Cassia multijuga*, *Euphorbia pulcherrima* and species and varieties of *Bougainvillea* and *Hibiscus*.

Work in connection with the remodelling of the Economic Section of the Gardens was continued and the clearing and replanting of Plot 1, previously used for manurial experiments with cocoa, completed. This area is now divided by grass paths into five smaller plots. Most of the trees in a collection of Avocado pears, planted in two of these plots in 1932, have grown well and the following varieties appear to be established :—Trapp, Kanola, Collinson, Dunedin, Winslowson, Butler, Mayapan, Simmonds, Cook's Seedling and a selected local variety. The other three plots were planted in 1933 with citrus, one of the principal objects in view being the determination of the fruiting seasons of some of the more important commercial varieties. For this purpose the Grapefruit Plot contains four trees of each of the following :—Marsh, Duncan, Foster, Thompson and Triumph. The varieties in the Orange Plot are Washington Navel, Hamlin, Pineapple, Lamb's Summer and Valencia. The fifth plot is to contain a miscellaneous collection of citrus, of which the following have been planted :—Portugal orange, sweet lime, a local seedless grapefruit, Barnado grapefruit, shaddock, Villafranca lemon and Satsuma orange. A row of four Sicilian lemon trees was planted along one side of the Grapefruit Plot. *Indigofera endecaphylla* has been planted as a cover crop throughout this series of plots, and its neat habit of growth and bright green colour gives a pleasing appearance, which has attracted the attention of many visitors, especially planters, several of whom have taken supplies of cuttings for the purpose of giving the plant a trial on their estates. Although rather slow

growing at first, *I. endecaphylla* is very effective in keeping down weeds once it becomes established, and its numerous small creeping stems make it useful as a preventative of soil washing on sloping land.

Plots 7 and 8, which also previously formed part of the manurial experiments with cocoa, had become much depleted by hurricane damage and old age, and the remaining trees were removed. Plot 7 was planted with nutmegs and plot 8 with Tonka beans. *Crotalaria ~~bacarpa~~ vasculosa*, established in the Tonka Bean Plot and elsewhere in the economic section of the gardens, has aroused considerable interest among planters as a promising cover crop. It reaches a height of two and a half feet, has a somewhat spreading habit of growth, and produces seeds freely. It is being given further trial in the gardens and by several planters.

Other work done in this section of the gardens included pruning and thinning the *Hydnocarpus* and other trees and shrubs of economic interest, improving the drainage systems, remaking and straightening paths, and making and planting borders of miscellaneous economic and decorative plants.

Small stocks of many species and varieties of decorative plants and plants of scientific or general interest were maintained for supplying the gardens or for distribution.

NURSERIES AND PLANT DISTRIBUTION.

The propagation and distribution of economic plants continued to form one of the department's most important duties. The general plant nursery and large citrus nurseries at headquarters were maintained throughout the year, as also were citrus nurseries at Soufriere, the Cabrits, Hampstead and Marigot for supplying outlying districts.

Fewer lime plants were propagated in 1933 as it was felt that the greater part of the areas best suited for this crop had been planted. A steady demand, however, existed and was responsible for supplies becoming exhausted by the beginning of December. It is intended to restrict further the supply of lime plants during 1934 and only to propagate sufficient to provide for replacements and the completion of plantings already begun.

Grapefruit trees were propagated in much larger numbers than formerly, and although the year's distribution was forty per cent greater than in 1932, the supply available considerably exceeded the demand. Several thousand trees of planting size remained in the nurseries at the end of the year and will provide excellent trees for distribution at the beginning of the next planting season. There is a growing interest in the cultivation of grapefruit, and this is likely to be stimulated by the development of a trade in the export of grapefruit juice. Marsh is the variety principally in demand.

The demand for orange trees was well maintained, Washington Navel and Valencia being the varieties principally distributed. Other varieties were propagated to meet special orders or for trial by the department. Preparation has been made to meet an anticipated increased demand in 1934.

No disease or pest assumed serious proportions in the nurseries and plants distributed were particularly clean and healthy. Close attention was paid to the quality of trees issued, all grapefruit and oranges being headed at approximately 28 inches from ground level and stake trained.

The demand for economic plants other than citrus was generally not as great as in the previous year. Coffee plants, however, were in fair demand, and distribution showed considerable increase. The nominal charge of 3d. each for lime and orange trees was continued. The price of grapefruit trees was reduced to 2d. in order to encourage planting and in view of the large supplies in hand. Economic plants other than those budded or grafted were distributed free.

Nursery work and Plant Distribution is financed by Imperial funds. Expenditure on this work in 1933 amounted to £1,031. 7. 10., and receipts for plants sold to £469. 10. 8½d.

The following tables show the variety and numbers of plants distributed during the year, and since the commencement of the Plant Distribution Scheme in 1927.

Budded or Grafted Fruit Trees.

Name of Plant.	*Total for 4 years 1927–30.*	*Total for 1931.*	*Total for 1932.*	*Total for 1933.*	*Total for 7 years 1927–33.*
Washington Navel Orange	3,590	1,427	2,188	1,524	8,729
*Oranges (Other)	17	78	491	1,443	2,029
†Grapefruit	5,201	5,048	6,267	8,781	25,297
Portugal Orange	143	19	28	7	197
Mandarin	59	27	117	69	272
Sweet Lime	74	19	83	23	199
Tangerine	113	9	68	169	359
West Indian Limes	31,399	26,453	31,691	23,643	113,186
Limes (Other varieties)	5,042	317	—	—	5,359
Lemons	2,742	1,246	50	16	4,054
Avocado Pears....	41	4	81	70	196
Mangoes	1,010	231	60	92	1,393
	49,431	34,878	41,124	35,837	161,270

*Principally Valencia.

†Chiefly Marsh.

Other Economic Plants.

Name of Plants.	*Total for 4 years 1927–30.*	*Total for 1931.*	*Total for 1932.*	*Total for 1933.*	*Total for 7 years 1927–33.*
Seedling Limes	41,720	—	—	—	41,720
Sour Orange	14,746	7,550	7,240	—	29,536
Coconuts	30,989	1,421	594	—	33,004
Cocoa	40,975	2,394	2,464	1,658	47,491
Coffee	105,841	16,439	937	3,140	126,357
Seedling Mangoes	186	58	12	—	256
Nutmeg	10,111	872	1,034	190	12,207
Tobacco	6,382	—	—	—	6,382
Mangosteen	360	—	—	—	360
Seedling Avocado Pears	97	10	188	20	315
Papaw	2,234	154	—	36	2,424
Tannias	30,530	1,070	—	70	31,670
Camphor	363	—	—	—	363
Black Pepper	620	60	—	152	832
Onions	25,700	28,437	500	—	54,637
Sugar Cane Cuttings	26,643	—	—	—	26,643
‡Miscellaneous	30,590	21,685	6,689	5,966	64,930
	368,087	80,150	19,658	11,232	479,127

‡Includes cuttings and plants for cover crop and mulch purposes.

THE LIME EXPERIMENT STATION.

The budded and grafted lime trees, planted in demonstration and trial plots at various times since 1928, generally made good growth during the year, and the Lime Experiment Station is gradually regaining the appearance it presented before the seedling lime trees were killed by hurricane damage and the root diseases which followed. Most of the young trees have now begun to bear, and the recorded plot yields show a satisfactory increase over those of last year.

The plot names and numbers in the following brief account of the progress of the demonstrations and trials correspond with those used in recent reports. The station was surveyed late in the year with a view to the renumbering of the plots.

Plots 1 to 11 were again used for citrus nursery work.

Plot 12 contains West Indian limes, budded on grapefruit stock, planted in 1930.

Plots 13 to 21 constitute a triplicate series of trials of various root-stocks for limes laid down in 1931. The trees in the plots numbered 13, 16 and 19 are on rough lemon stocks, those in numbers 14, 17 and 20 on grapefruit stocks and those in 15, 18 and 21 on sour orange stocks. There is still little apparent difference in the development of the trees, but growth on grapefruit stock continues to be the most vigorous. These nine plots are situated on steep land and it has been necessary to guard against the soil being badly washed during heavy rains. In plots 13 to 15 *Indigofera endecaphylla* planted as a cover crop is satisfactory for this purpose, and is also effective in checking the growth of weeds. This plant is not, however, an ideal cover crop under bearing lime trees as fallen fruits are difficult to gather from among its dense growth. An attempt is being made to improve plots 16 to 18 by utilising mulch material and silt from the drains for the purpose of gradually building up the beds in terrace-like formation. Plots 19 to 21 have been deeply forked, the existing cover crop being dug in. New drains were made, and the soil excavated used in building up the lower parts of the beds. A row of lemon grass was planted above each drain, and the plots resown with cover crops.

Plots 22 to 24. The yield from these three plots of West Indian limes on sour orange stock, planted in 1916, was a little less than that of last year, and amounted to 70½ barrels per acre.

Plots: Spiny 1 and 2. The crop produced by these plots in 1933 was at the rate of 96⅔ barrels per acre, being 48 per cent less than the 1932 crop. Although the trees appear healthy the severe straining and twisting sustained by many of the branches during the hurricane of 1930 is still having its effect, and during the early part of the year under review a large amount of dead or dying wood was removed. The consequent reduction of the bearing area of the trees is mainly responsible for the decrease in yield.

Trial comparing Grafted with Budded Limes. The trees in this trial, laid down in 1929, are mostly developing well, and there is little apparent difference between the budded and the grafted trees.

Plot: "Jack's Will." This plot which is on a steep hillside is traversed by gullies, and is typical of much of the land planted with limes in Dominica. The principal purposes of the plot are the demonstration of cultural methods and the production of revenue. It is, however, divided into four sections, and laid out with the object of comparing the effect of different planting systems and distances. Most of the trees have begun to bear and records of the yields of each section are being kept.

Plots: "Old Limes" and "Martin's Field." These two plots, also, are maintained chiefly for revenue purposes and to demonstrate good cultivation. Both are situated on hillsides and show the value of the use of lemon grass in the prevention of soil washing, and of *Tephrosia candida* as a light windbreak.

Top-working Lime Trees. In view of the possibility of overproduction of lime products in the future it was considered desirable to investigate the possibilities of top-working budded lime trees with grapefruit. A trial of various methods of top-working to determine the most successful under the climatic and other conditions existing in Dominica, and also the compatibility between the lime and the grapefruit, has been started. A section of "Old Limes Plot" containing limes trees budded on sour orange stocks is being devoted to this trial. These trees had been budded at about eight inches from the ground and were planted out in 1930. By the latter part of 1933, when thirty-one trees were top-worked, they had grown to a height of about seven feet, and girth measurements taken at the point of union of stock and scion, averaged nine inches. The methods of top-working being tried include the following:—Cutting back the trees to about eighteen inches from the ground and inserting buds on the resulting new lime shoots; cutting back to the sour orange stock and budding on the new sour orange shoots; cutting back to two-year-old lime wood and inserting buds on such wood; cutting back to older lime wood and crown grafting; cutting back to the sour orange stock and crown grafting. By the end of the year the buds or grafts on many of the trees had begun to grow. Similar trials are also being conducted with limes on grapefruit and rough lemon stocks.

WORK ON LIME BREEDING AND SELECTION.

Efforts to obtain a lime highly resistant to withertip disease and possessing the good qualities of the West Indian lime were continued.

All seedlings, resulting from the crosses made in 1926, which showed promise were kept under observation. The most promising of these were back-crossed with West Indian lime in 1931, and the progeny have now been grafted on to sour orange or rough lemon stocks. Early in 1933 three more of the original Woglum × West Indian hybrids were back-crossed with the West Indian lime. The following crosses were made between seedlings of the F1 generation: D. 29 × D. 16; D. 20 × D. 29.

A form of West Indian lime sent to the department for trial was found to be susceptible to withertip disease.

Four selected West Indian lime plants numbered B. A. 3, B. C. 3, B. C. 4 and B. H. 5, budded on grapefruit stock, were received from Melville Hall Estate and have been planted in the department's trial ground at Copt Hall.

It was at one time thought that it would be possible to grow profitably the Woglum lime, or the Philippine (Aurantifolia) lime, on a commercial scale in withertip areas for the production of concentrated juice, and it was hoped that a market would ultimately be found for the oils obtained from these varieties. The collapse and practical loss of a market for concentrated lime juice and the information that these oils would not have a ready market seems to rule out any prospect in this direction. Reports received on two occasions from the Imperial Institute on samples of ecuelled oil from the two varieties showed that the oils did not compare favourably with the lime oil of commerce, that of the Philippine (Aurantifolia) lime being particularly inferior. At the suggestion of the Imperial Institute a sample of distilled Woglum lime oil was obtained from the owner of Sherwood Estate and was forwarded during the year. The following is an extract from the report received:—

"Commercial Value."

"The oil, together with a table of the constants as determined at the Imperial Institute, was submitted to firms of essential oil distillers (a) and (b), and brokers (c) in London, who reported on it as follows:—

(a) 'This sample is a distilled oil of limes having an optical rotation higher than that of the ordinary West Indian lime oil, the rotation of the one being +57.55° as against +45°. We find the odour sweet and fresh, but think it lacks a certain full-bodied note which is characteristic of the ordinary West Indian oil and we feel that from an essence maker's point of view the Woglum oil would not be a suitable substitute. Owing to the present prices prevailing for the West Indian lime oil its use has been largely confined to the manufacture of flavouring essences for syrups and beverages.'

(b) 'We have examined this sample and are in agreement with your figures. While the flavour is pleasant, it lacks body and in our opinion is not equal to, nor could it replace, the ordinary West Indian distilled lime oil.'

(c) 'We have examined the sample of distilled lime oil and find the flavour only fair. The figures are somewhat abnormal and we are afraid that oil of this description would only be saleable readily during a marked shortage of normal oil.'

Remarks.

"The results of this investigation show that this sample of distilled Woglum lime oil is inferior to commercial West Indian distilled lime oil, and that such oil would not be readily marketable. In view of the fact that the ecuelled oil of the Woglum lime is also of a somewhat different character from the ordinary West Indian product it would appear that this variety of lime may prove unsuitable for commercial exploitation."

THE LIME INDUSTRY.

Although the exports of lime products for 1933 show a decrease in quantity as compared with the previous year, agriculturally the industry is fast recovering from the disasters which virtually destroyed all seedling lime cultivations. It is estimated that some 1,500 acres have now been planted in limes budded on disease and hurricane resisting stocks. A good proportion of these plants is now commencing to bear fruit, and an increase in the production of lime products may soon be expected.

Efforts being made in other countries to promote or extend lime cultivations are occasioning lime-growers in Dominica some concern. The extent of these developments, especially in view of the disappearance of a profitable market for concentrated lime juice, indicates that there is a definite danger of overproduction of lime products. A serious note of warning in this respect was sounded at the West Indian Inter-Colonial Fruit and Vegetable Conference held in Jamaica during the year. It is considered by many that long experience in the industry will enable the Dominica producer to hold his own, but keen competition from outside sources will undoubtedly occur and have its effect on the Dominica industry. A remunerative market is likely to be found only for products of high quality, and if simple standard tests could be agreed upon, and enforced to guarantee such quality, the local industry would be in a better position to compete with that in other places. It must be realised that the extent of the world's market for lime products is decidedly limited.

During the year lime-growers experienced little difficulty in disposing of their crops as fresh fruit, lime oils or raw juice. The local price for yellow limes, in season, remained firm at eight shillings per barrel and the price for green limes at twelve to sixteen shillings per barrel. The market values of lime oils remained at a fairly high level, the demand for distilled oil being greater than for ecuelled. Lime oils now represent the main products of the industry.

Shortage of production together with the remunerative price obtainable for distilled oil prevented any general expansion of the green lime trade. Exports of green limes to Canada, however, showed a considerable increase. This was chiefly due to business being arranged on an f.o.b. basis. Small trial shipments of green limes to England were again made, and met with varying results. Limes for export to the United States of America are packed in private packing-houses, and are subject to Government inspection. Fruit destined to England, Canada and Bermuda is selected and packed at the Government Marketing Depôt under the supervision of officers of the Agricultural Department.

The Treasury return of exports of lime products during 1933 is as follows:—

Products.	Quantity.	Value. £
Essential Oil (Distilled).	9,302 lbs.	10,288
Otto of Limes (Hand-pressed or ecuelled).	320 ,,	353
Green Limes	4,325 brls.	4,028
do. do.	3,696 boxes	865
*Raw lime juice	37,770 gals.	1,889
Concentrated lime juice.	35,467 ,,	1,817
Lime juice cordial ..	70 ,,	10
Pickled limes	10 brls.	16
Oils in solution in Raw Juice exported ..	407 lbs.	407
		£19,673

*Includes all juice other than concentrated.

During the year producers were enabled to cut their losses on existing stocks of concentrated lime juice by accepting the offer of a low price. In order that shippers should not be faced with too great a loss the Government reduced the rate of export duty, and steamship lines assisted by reducing the freight rate.

The following table shows the quantities of each product, calculated as barrels of fruit, actually exported in 1933.

Products.	Barrels of fruit.	Approximate percentage of total crop.
Distilled Lime Oil ..	26,946	74.84
Ecuelled Lime Oil ..	2,560	7.11
"Oils in Solution" ..	1,357	3.77
*Green Limes	5,130	14.25
Pickled Limes	10	.03
	Total .. 36,003	

The conversion table is as follows:—

Ecuelled oil (lbs.) multiplied by 8 equals Barrels of fruit ecuelled.

Total distilled oil (lbs.), minus total ecuelled oil (lbs.), multiplied by 3 equals Barrels of fruit unecuelled.

Oils (lbs.) in solution in raw lime juice multiplied by 3⅓ equals Barrels of fruit exported as raw juice.

* Includes limes packed in boxes, i.e. citrus crates of 2 cu. ft. capacity and tomato crates of ¾ cu. ft. capacity. The number of barrels given is calculated on the following basis:

2½ citrus crates equal 1 barrel.
6⅔ tomato crates equal 1 barrel.

For the purpose of comparison with former years, the following table gives the crop expressed in round numbers shipped annually since 1921. It does not necessarily represent yearly production, owing to the carry over from year to year of certain products.

Years.	*Barrels.*	*Remarks.*
1921	516,000	Prior to appearance of Withertip.
1922	400,000	
1923	228,000	
1924	424,000	Includes large carry over from 1923.
1925	230,000	
1926	214,000	Hurricane and appearance of Red Root.
1927	210,000	
1928	205,000	Hurricane September 12th.
1929	133,000	
1930	114,000	Hurricane September 1st.
1931	68,000	
1932	48,000	
1933	36,000	

MINOR INDUSTRIES.

Definite progress has been made in most of the minor industries, and production from the various crops grown has, in nearly every instance, shown an increase. Dominica is now recovering from the disastrous effects of a series of hurricanes and a continued increase in production is to be expected, especially if prices improve.

Bananas. A marked advance has been made in this industry and fairly regular shipments of fruit were made to England. In the latter half of the year a few shipments were also made to Canada. The export business was in the hands of a company who had made large plantings which came into bearing during the year. This company also organised the purchase of bananas to augment supplies from their own lands. This has resulted in awakening a general interest in the cultivation of bananas. Although at first shipments to England showed heavy bruising, due to inexperience in handling this fruit, they were on the whole satisfactorily reported on. In their keenness to foster the trade the brokers sent a representative to Dominica to demonstrate to the shippers the care necessary in the selection and handling of the fruit for export. As a result subsequent shipments showed marked improvement and this co-operation on the part of the brokers was much appreciated.

The trade with other West Indian islands was maintained. The total exports of bananas for the year were more than double those of last year and amounted to 22,304 bunches. Of these, 10,099 were shipped to England, 6,118 to West Indian islands and 6,087 to Canada.

Other Fruits. The production of grapefruit, oranges, Avocado pears and mangoes all showed considerable increase as compared with the previous year. This industry is fully reviewed in this report under the heading of Government Marketing Depot.

Grapefruit growers are turning their attention to the preparation and export of grapefruit juice, and trial shipments have been made to England and Canada.

The Department made special efforts to interest the better class of smallholder in the cultivation of grapefruit. A scheme was put into effect whereby approved smallholders were supplied with young trees free of charge on the undertaking being given that they would cultivate approximately one acre of this crop under the supervision of agricultural officers. So far twenty-three smallholders in the Northern and Eastern Districts have expressed their desire and willingness to participate in this scheme and have been supplied with plants. The scheme is being closely watched by officers of the department, who pay frequent visits to the holdings and demonstrate to the growers the necessary cultural operations.

Cocoa. Cocoa plantations have now made good recovery from the effects of hurricane damage, and new plantings are coming into bearing. Peasants contribute largely to the production, and the export of 358,112 pounds in 1933 was an increase of thirty-three per cent over the previous year's figures.

Coconuts. Although the exports of copra showed a slight fall in quantity production was actually greater than in the previous year, producers having refrained from shipping during the latter part of the year hoping for better prices and a revision of the rates of export duty. Coconut plantations have now made good recovery and a fairly large acreage of new plantings is commencing to crop. The trade in dry nuts also showed a slight decrease.

Rum. Dominica rum met with an increasing demand from the neighbouring islands, and exports were slightly more than double those of the previous year. Large stocks, however, are still being carried by producers, and syrup, which is largely supplied by the peasantry, met with a slow trade at low prices.

Bay Oil and Bay Rum. In common with other agricultural products this industry was affected by the general trade depression and prices were lower. Exports, however, show a slight increase.

Attention is now being given to the manufacture of bay rum for export and local use.

During the year further investigations were made of the commercial possibilities of the inferior types of oil obtainable from trees abounding wild in the Carib Reserve and other parts of the Windward Coast. The most common of these types is the anise-scented variety of *Pimenta acris.* A collective sample of this oil was obtained with the co-operation of distillers in the Northern District and submitted to the Imperial Institute, London, for

examination. The results of the examination generally confirm those obtained with the sample submitted to the Imperial Institute in 1927 and indicate that there is little prospect of the oil being marketed at a remunerative price. The Imperial Institute also submitted the sample to two firms of essential oil distillers, a firm of importers and a soap manufacturing firm, whose opinions differed only in minor details, and who all agreed that there is little prospect of developing even a small trade in this oil.

Coffee. Coffee-growing is mainly a peasant industry and most of the coffee produced is consumed locally. The year's export was 1,183 pounds.

TABLE OF EXPORTS FROM DOMINICA FOR THE TRIENNIAL PERIOD 1931 TO 1933.

	1931.	1932.	1933.
Lime Products:			
Concentrated Juice ...	3,211 gals.	5,561 gals.	35,467 gals.
Raw Juice	93,255 ,,	62,545 ,,	37,770 ,,
Lime Juice Cordial ...	324 ,,	260 ,,	70 ,,
Distilled Oil	14,446 lbs.	11,218 lbs.	9,302 lbs.
Ecuelled Oil	2,158 ,,	617 ,,	320 ,,
Green Limes	11,014 brls.	8,299 brls.	5,130 brls.
Pickled Limes	123 ,,	2 ,,	10 ,,
Other Fruit and Allied Products:			
Oranges	5,271 crates	7,513 crates	9,383 crates
Orange Oil	830 lbs.	443 lbs.	1,470 lbs.
Grapefruit	1,531 crates	3,954 crates	5,981 crates
Grapefruit Juice	—	—	1,088 gals.
Bananas	1,556 bunches	9,019 bunches	22,304 bunches
Mangoes	4,006 crates	6,743 crates	6,872 crates
Avacado Pears	670 ,,	1,550 ,,	2,946 ,,
Miscellaneous	£47	£9	£58
Cocoa Products:			
Cocoa, Raw	218,773 lbs.	260,099 lbs.	358,112 lbs.
Cocoa, Prepared	57 ,,	97 ,,	312 ,,
Coconut Products:			
Copra	45,526 lbs.	107,107 lbs.	105,237 lbs.
Coconuts	50,355	116,140	109,357
Sugar Products:			
Rum	1,380 gals.	11,520 gals.	24,660 gals.
Bay Products:			
Bay Oil	17,783 lbs.	20,915 lbs.	21,774 lbs.
Bay Rum	—	—	76 gals.
Spices:			
Vanilla	144 lbs.	1,974 lbs.	21 lbs.
Nutmegs	—	£2	£2
Ginger	£20	£38	£2
Various Products:			
Coffee	87 lbs.	396 lbs.	1,183 lbs.
Vegetables	£129	£123	£102
Farine	£1	£7	£83
Hides and Skins	—	£18	£5
Leather, Unmanufactured	£31	£59	£42
Turtle Shells	388 lbs.	220 lbs.	—
Baskets	—	£7	£14
Tobacco and Cigars ...	—	3,640 lbs.	2,109 lbs.
Forest Products:			
Hardwood	20,840 ft.	65,248 ft.	65,193 ft.
Firewood	22 cords	212 cords	84 cords
Canoe Shells	£39	£133	£55
Shingles	£2	£8	£1
Charcoal	£1	£15	£6
Locally made boats ...	£25	£162	£109
Total Re-Exports ...	£10,115	£4,660	£4,204
Local Value of Total Exports ...	£68,938	£50,736	£45,024

NOTE. Various sized packages are used in the export of fruit and exports given above are converted to the most common pack.

PESTS AND DISEASES.

Root Grubs (*Lachnosterna sp., Diaprepes sp., etc.*) These grubs were active in attacking roots of young citrus trees and responsible for many losses. The difficulty in combatting these pests is that it is not possible to determine the presence of the grubs until root damage is so far advanced as to lead to the possible death of the tree. Measures for control recommended in previous reports have met with partial success, particularly the hand picking of the beetles when these are prevalent and eating the leaves. The digging in of "Vaporite," a soil fumigant, when root damage is not far advanced has given fairly good results.

The department's citrus nurseries were at one time heavily infested with root grubs, but much less trouble is now experienced. This improvement is attributed to the hand picking of the adult insects and the system of cultivation now practised. After the distribution of trees from a section of the nursery, the land is deeply forked. It is then planted with a cover crop not likely to harbour these grubs, e.g. Crotalaria, and after several months forked again before being replanted with citrus stocks. The success of these methods seems to indicate the value of tillage for the control of root grubs, and although not easily applied to established plantings, a system of cultivation similar to that described should be considered for the preparation of land for new plantings.

Scale insects. Most estates continue to have trouble with this pest, especially on young citrus trees. "Sulphemulsol," a new insecticide which is stated also to have fungicidal properties, has been found effective for the treatment of scale insects. This insecticide was evolved at the Imperial College of Tropical Agriculture, Trinidad, in co-operation with Trinidad Leaseholds Ltd. Supplies were received by the department and distributed to planters for trial. The systematic use of Sulphemulsol has been found to have the effect of quickly cleaning up the stems of young citrus trees affected with scale and if this preparation bears out its early promise it is likely to find general use on estates in Dominica. Further experiment, however, is necessary to determine the most suitable concentrations of the insecticide for different crops at various stages of growth. Injury to young citrus and Avocado pear leaves has been observed after the use of a four per cent solution. The use of a two per cent solution followed by a further application at the same strength, ten or fourteen days later, has proved effective without causing injury to young growths.

Wilt of "Cocoyes." Specimens of diseased "Cocoye" plants (*Musa* sp.) obtained from an estate in the northern district were forwarded to the Imperial College of Tropical Agriculture for examination. It was reported that there seemed little doubt that the trouble was Moko, a Bacterial Wilt Disease (*Bacterium solanacearum* E. F. Sm.). Susceptible varieties include: Dwarf or Cavendish banana, Red banana, Giant Fig, Moko (Bluggoe of Grenada) and other plantains. Affected plants should be eradicated by digging out and burning, or by the application of heavy gas oil. Before replanting, large holes should be dug and the soil well aerated, limed and exposed for some time. In replanting it is important that only disease-free material be used.

LEGISLATION.

A Proclamation dated the 5th August, 1932, under the Plants Protection Ordinance, 1927, (Dominica No. 2 of 1927) and published as Statutory Rules and Orders, 1932, No. 12, contains schedules of articles absolutely prohibited and articles conditionally prohibited importation into the Presidency.

During the year Statutory Rules and Orders, 1931, No. 17, made under the Exportation of Fruit Ordinance, 1929, (Dominica No. 4 of 1929) were repealed, and Statutory Rules and Orders, 1933 No. 9, made and passed in lieu thereof. These rules were amended by Statutory Rules and Orders, 1933, No. 10, to provide an additional rule concerning the wrapping of fruit for export.

An Ordinance, Dominica, No. 6 of 1933, further amending "The Exportation of Fruit Ordinance, 1929," was passed during the year to provide for Government inspection of bananas intended for export.

The rules for the protection, management and regulation of the Botanical Gardens made in 1908 under the Botanical Gardens Act, 1898, were rescinded and Statutory Rules and Orders 1932, No. 19, made and proclaimed in lieu thereof.

AGRICULTURAL INSTRUCTION.

Agricultural School.

The propagation of citrus on a large scale again necessitated the employment of a number of young men as budders. These were given practical and theoretical training in general agriculture in addition to a more specialised training in the propagation of citrus. The department's policy in regard to the general agricultural training of budders and other young men employed at Headquarters and the Government Fruit Farm was discussed in last year's report, and the system there outlined was followed and extended.

Three pupils completed their period of training and returned to their own villages. The pupils' overseer also left the department, and his post was filled by the senior pupil.

An entrance examination held to select four probationers attracted twenty-three candidates, which indicates the keenness existing to obtain such employment and training.

The principal practical work performed by pupils and probationers consisted of budding citrus and training the young trees in the nurseries. Two senior pupils were employed on special duties throughout the year, one at the Government Fruit Farm mainly in keeping cost accounts, and the other as seed-collector in the Botanic Gardens. Other practical work done by pupils included the preparation of nursery beds, sowing seeds, planting stocks, budding and grafting fruit trees, pruning fruit trees, potting plants, lining and draining citrus plots, preparation of planting sites, planting citrus trees, preparing and applying insecticides and fungicides, and keeping crop records, labour books and cost accounts. This practical work was closely supervised by the senior and junior officers of the department, and particular care was taken to train the boys in correct agricultural and horticultural practices. The main citrus nurseries of the department are situated in the Lime Experiment Station, and pupils were given opportunities to observe the routine work of the demonstration plots and the progress of the various trials.

An extensive schedule of lectures drawn up early in the year had to be modified owing to pressure of work in other directions. The syllabus of lectures given was as follows:—

1. General Botany (courses continued from previous year.) Instructor: W. E. Bassett.

   Senior course: 19 lectures.

   Junior course: 22 lectures.

2. Picking and Preparing Citrus Fruits for Export. Instructor: E. E. Taylor.
   7 lectures and demonstrations.

3. Sugar Cane Cultivation. Instructor: E. E. Taylor.
   7 lectures.

4. Simple Arithmetic as Applied to Agriculture. Instructor: C. M. Alexander.
   12 lectures and demonstrations.

5. Propagation of Fruit Trees. Instructor: G. J. Stedman.
   10 lectures and demonstrations.

The total number of lectures given was seventy-seven, and the average number of pupils attending was eighteen. The pupils were required to write a summary of each lecture, the principal object being to provide them with notes for future reference. These notes, which were corrected and marked by the instructor after each lecture, also indicated the extent to which the subject had been grasped. Examinations held on the completion of each course showed that a fair knowledge of the subjects was gained by most of the boys. As usual, pupils were from various parts of the island, and standards of general education represented among them varied considerably; two had received secondary school education. It was therefore difficult to frame courses of lectures in such a manner as to make them suitable for the pupils as a whole. This difficulty was, however, lessened by arranging senior and junior classes for most subjects, and by dictating notes to the most backward pupils where necessary.

Visits to Estates.

The senior officers of the department paid frequent visits to the most important estates and also to a number of small holdings. These visits enabled officers to keep in

contact with members of the planting community and to discuss and advise on problems affecting any particular estate. During these visits opportunity was taken to follow up plants supplied by the department under the Plant Distribution Scheme.

Estates receiving financial assistance from the Government were frequently inspected, and progress reports, with recommendations, were submitted to the Government. The Commissioner of Agriculture together with the Agricultural Superintendent made an agricultural survey of Government Loan Estates, and in this connection inspected and reported on twenty-nine properties.

Officers of the department greatly appreciate the hospitality afforded by planters on the occasion of their visits to outlying districts.

Eastern District.

Agricultural instruction in this district is chiefly in the hands of the Travelling Agricultural Instructor who continuously visited peasants' holdings for the purpose of advising small growers in agricultural matters. He also follows up plants distributed from the department's nurseries, advising on the general care and cultivation of such plants.

In view of the increasing interest shown by peasants in the growing of bananas and the possibility of this industry developing, much time was spent in giving instruction in the selection of clean planting material and the cultivation of this crop.

In order to interest small holders in the cultivation of grapefruit, trees were given free for planting in selected areas. Nine one-acre plots have so far been planted under the supervision of the Travelling Agricultural Instructor.

Greater care is now being taken by the peasants in the selection of bay leaves for distillation, with the result that local buyers are able to obtain supplies of oils with more uniform phenol content. Bay, coffee, limes and ground provisions are the crops principally grown by the peasantry.

Schools and school gardens were frequently visited and instruction given in garden management.

DETAILS OF ADMINISTRATION.

Expenditure and Revenue.

Statements of expenditure and revenue with regard to special services are given in the appropriate sections of the report. Expenditure, other than on special services, and the general revenue of the Department was as follows :—

Expenditure.

	£	S.	D.
Personal Emoluments	1,413	10	10
Contingencies	12	16	10
Travelling Expenses	74	17	10
Maintenance of Botanic Gardens	318	9	3
Cultivation Saleable Products etc.	299	12	10
Purchase Special Manures	54	1	0
Printing Reports etc.	25	2	9
Experiment Station	349	17	4
Upkeep of Morne Bruce Lands & Military Cemetery.	19	13	0
Chemicals & Apparatus	8	13	0
Upkeep of Horses & Mules	25	2	5
*Rent of Quarters for Assistant Agricultural Officer...	21	5	0
Travelling Allowance to Assistant Agricultural Officer, Northern District	68	2	4
Agricultural Instruction	549	5	2
	£3,240	9	7

Receipts.

Limes	£55	13	2½
Cocoa	13	7	2½
Fruit	82	15	2½
Onion Seed	14	3	1½
Vegetable Seed		15	4
Miscellaneous	7	14	2
Laboratory Receipts	22	19	0
	£197	7	3

*Sub-let during the year; rent collected £15.

Staff.

Mr. H. B. Pidduck, Assistant Agricultural Officer, Northern District, was granted leave from the 30th September, 1933, to the 18th December, 1933, for the purpose of attending a Refresher Course at the Imperial College of Tropical Agriculture, Trinidad.

Mr. E. E. Taylor, Officer-in-Charge, Government Marketing Depot, was absent on leave from 8th July, 1933, to the 28th September, 1933. He acted as Secretary to the Fruit Trade Committee during the year.

Mr. S. A. Schouten was temporarily appointed Assistant Agricultural Officer, in charge of the Government Fruit Farm on the 3rd April, 1933. He also acted as Officer-in-Charge, Government Marketing Depot during Mr. Taylor's absence on leave.

Mr. W. E. Bassett, Assistant Agricultural Officer, acted as manager of the Government Fruit Farm from 1st January, 1933, to 3rd April, 1933, in addition to carrying out his usual duties.

Exchange of Plants and Seeds.

Contributions of plants, seeds or budwood received during the year included the following:—

Antigua, Agricultural Department. Seed of *Corypha umbraculifera.*

Atkins Institution of the Arnold Arboretum, Cuba. 6 packets of seeds and a plant of *Hedychium Gardnerianum.*

Australia, Commonwealth Forestry Bureau. Seed of *Eucalyptus naudiniana.*

Prof. Juan Balme, Mexico. 25 packets of seeds.

Coconut Grove Arboretum, Florida. 5 packets of palm seeds.

Mr. A. H. Green, Dominica. Seeds.

Grenada, Agricultural Department. Cuttings of *Spondias* sp.

Capt. H. A. Johnstone, England. 23 packets of palm seeds.

Kew, Royal Botanic Gardens. Seed of *Rubus illicebrosus.*

Mr. W. A. Knight, Grenada. Plants and seeds of nutmeg.

Trinidad, Department of Agriculture. 5 packets of seeds.

U. S. Department of Agriculture, Washington. 45 packets of seeds.

U. S. Plant Introduction Garden, Florida. Budwood of Lamb's Summer orange.

Recipients of plants, seeds or budwood from the Department included the following:—

Antigua, Agricultural Department. Budwood of orange varieties.

Atkins Institution of the Arnold Arboretum, Cuba. 12 packets of seeds.

Prof. Juan Balme, Mexico. 24 packets of seeds.

Barbados, Department of Agriculture. Citrus plants.

British Guiana, Department of Agriculture. Ginger roots (presented by Capt. Ashpitel from Melville Hall Estate.)

Dr. C. H. Hueck, Nicaragua. 16 packets of seeds.

Manila, P. I., Department of Agriculture and Natural Resources. Budwood of cocoa varieties.

Commander Noble, Antigua. Seeds and cuttings of *Hibiscus Waimeæ.*

Nyasaland, Department of Agriculture. Seeds.

Dr. G. Poirault, France. Seeds.

Porto Rico, U. S. Forest Service. 17 packets of seeds.

St. Kitts, Agricultural Department. Budwood of 5 varieties of citrus.

St. Lucia, Agricultural Department. Budwood of Dancy tangerine.

Trinidad, Department of Agriculture. Orchids and seed of *Bassia latifolia.*

Trinidad, Imperial College of Tropical Agriculture. Seed of *Crotalaria* ~~*obcarpa.*~~ *vasculosa*

Messrs. Vilmorin-Andrieux & Co., Paris. Seed of *Ormosia dasycarpa.*

Virgin Islands, U. S. Department of Agriculture. Seeds.

Correspondence and Distribution of Information on Agricultural Matters.

Six hundred letters were despatched and six hundred and seventy-three Minute Papers dealt with, in addition to numerous Confidential Minute Papers. Over nine hundred bills were despatched during the year. Various pamphlets and copies of reports were distributed to planters interested.

Laboratory Work.

The following tests were made during the year :—

Raw Lime Juice	..	..	5
Concentrated Lime Juice		..	7
Bay Oil	..	..	376

Milk testing is undertaken by the Assistant Agricultural Officer stationed in the Northern District.

Repairs and Additions to Buildings Etc.

An office for the Assistant Agricultural Officer stationed at headquarters was built on to the end of the Lecture Room. The room previously used for the purpose is now occupied by the seed-collector, and is also used as a store.

A flight of twelve concrete steps, leading from the new citrus plots to the Lower Garden Path, was constructed in the course of remodelling the Economic Section of the Gardens.

New gates were fitted at the Esmall Gate entrance.

Other renovations or improvements carried out in the Botanic Gardens included repairs to boundary walls, repairing and painting the drinking fountain and shelter, and fixing new penthouses to the office buildings.

Increased production of oranges and grapefruit necessitated the extension of space for the storage of crated fruits prior to shipment, at the Government Marketing Depot. For this purpose the Public Works Department began the preparation of an additional large storeroom, part of which has been brought into use. A wooden shute was built to convey made up crates from the crate room to the packing room. The outer walls of the Depot building were whitewashed and the doors and gates painted.

At the Government Fruit Farm, Copt Hall the mill house, which is used as an office, was re-roofed by the Public Works Department. Most of the timber used was obtained on the estate.

Visitors to the Department.

Among the visitors to the department during the year were:—His Excellency Sir Reginald St. Johnston, K.C.M.G., Governor of the Leeward Islands, and Lady St. Johnston; His Honour W. A. Bowring, C.B.E., Administrator, Dominica, and Mrs. Bowring; Prof. H. A. Ballou, C.B.E.; Mr. G. A. Jones, Commissioner of Agriculture for the West Indies; Mr. A.K. Briant, Assistant to the Commissioner of Agriculture; Mr. A.C. Shill, Marketing Officer for the Leeward and Windward Islands; Dr. A. E. S. McIntosh, Department of Agriculture, Barbados; Mr. N. E. Sanderson, representative of the United Fruit Company; Mr. & Mrs. Proctor-Cooper and party, U.S.A.; Hon. R. S. D. Goodwin, Antigua; Mr. & Mrs. H. C. Collier, Canada.

DIVISIONAL REPORTS.

Reports by the officers in charge of different branches of the activities of the Department follow these notes on the main features of such work during the year.

Northern District. The Assistant Agricultural Officer stationed in this district was principally engaged in instructional work among peasants and in efforts to arouse the interest of peasant proprietors in the cultivation of crops other than limes. Three nurseries were maintained for supplying the plant requirements of the district. The reconstruction of the Portsmouth-Hatton Garden Road which was commenced during the year has acted as a stimulus to agricultural activity, and estates are now interested in the cultivation of grapefruit, a crop which could not previously be grown owing to lack of transport facilities. This district is the chief centre of banana supplies for export and much time was given in instructing small growers in the proper handling of the fruit for export and the care necessary in selecting disease free material for new plantings.

Government Marketing Depot. The Officer-in-Charge of the Government Marketing Depot reports a marked increase in the quantity of fresh fruit exported either through or by the depot, and that on the whole prices were satisfactory during the year. The estimated f.o.b. value of fruit packed by the depot amounted to £7,629—an increase of £2,766 over that of the previous year.

The period covered by an Imperial Grant in aid of the Peasants' Information Bureau has now expired, and the work of this institution will as far as possible be carried on by the Marketing Depot. The functions of these two departments are in many respects similar, the operations of the Marketing Depot being an extension of the Bureau's activities. The staff of the bureau is employed in both operations, additional clerical staff being provided for marketing depot work. In future it is intended to amalgamate these two departments and to finance them from one vote instead of three as obtained during the year.

A new system of accounting, formulated by the Treasurer, has been brought into use and enables the purchase and sale of packing materials and the general trading expenses of the marketing depot to be financed from an advance account.

Mr. A. C. Shill, Marketing Officer for the Leeward and Windward Islands transferred his headquarters to St. Lucia at the beginning of the year. He continued to visit Dominica for the purpose of advising on marketing problems and his assistance in this respect and in matters leading to increased efficiency at the depot is much appreciated.

The Department also gratefully acknowledges the assistance given by the Fruit Trade Committee, which regularly met to consider and advise on general matters affecting the fruit industry.

Government Fruit Farm. The development of the Government Fruit Farm proceeded along the lines of the approved scheme, and good progress was made during the year. All cultivable land has now been cleared and plantings of citrus will be completed during the next planting season. Care is being taken to provide roads for the plots and establishing wind breaks where necessary. Development work has been in progress just over three years and early plantings of grapefruit have made good growth and are particularly promising.

Report of the Assistant Agricultural Officer, Northern District.

In 1933 special efforts were made to foster the extension of areas under grapefruit and bananas, in addition to encouraging improvements to existing cultivations, chiefly of coconuts, limes and cocoa.

The new road from Point Round to the Fond Hunt plateau north-west of Morne Diablotin was completed by the Public Works Department, and reconstruction of the Portsmouth-Hatton Garden Road begun. Frequent visits were paid to the localities served by these roads, but other localities also received some attention, such as Colihaut and Vieille Case. While the road programme acted as a stimulus to agricultural activity, some of the best labour was drawn thereby from the land.

The nurseries at Hampstead, Marigot and the Cabrits (Portsmouth) produced over 8,000 budded citrus plants, and also a number of seeds, seedlings and cuttings of a miscellaneous nature.

In September the Cabrits was put in charge of a single propagator to clear and tend surplus plants, 500 of which were on hand at the end of the year. It was mentioned last year that in all three nurseries large numbers of over-sized lime plants remained from 1932. These were very difficult to handle and their maintenance absorbed funds which would normally have been devoted to planting stocks for 1934 budding. There will be a reduction in output in that year as a result.

Use was again made of the nurseries for the training of young men in practical work, the keeping of records and a limited amount of theory. They assisted several estate and peasant nurseries in propagation work. The plots of citrus fruits on various stocks were maintained and a few trees commenced to bear.

The rainfall recorded was 77.96 inches at the Cabrits, but at Hampstead 113.58 inches were registered. At the latter and at Marigot the end of the year was very wet and citrus scab and "damping-off" on rough lemon and grapefruit seedlings respectively proved troublesome.

Instruction in schools and on garden management was continued.

Attempts were made to arouse the interest of small growers in the planting of grapefruit, and a public meeting was convened in March at which the Portsmouth Grapefruit Growers' Association was inaugurated. Inspections were made for the selection of sites, etc. and at a subsequent meeting a lecture was delivered, and a demonstration in planting given on a plot adjacent to the Recreation Ground belonging to the Secretary. A maximum of 50 plants was offered free to approved applicants, 14 of whom responded during the year. Others have agreed to commence planting in 1934.

In connection with the new banana industry the bulk of the crop exported was grown by peasants in this district, and assistance was rendered to the buyers at the roadside, the shipping point and on board in giving instruction in methods of handling the fruit. Advice on cultivation was given to growers and public meetings held at various centres. A small plot of bananas was planted at Borne in a prominent position near the main road for demonstration purposes.

Three visits were paid to Roseau to keep in close touch with the work at Headquarters, and in the last quarter a Refresher Course was taken at the Imperial College of Tropical Agriculture, Trinidad. During this period, visits were paid to the district by other officers of the department.

Details of plant distribution, work in connection with pests and diseases, and other investigations are embodied in the appropriate sections of the departmental report.

H. B. PIDDUCK,
Assistant Agricultural Officer.

Report of the Officer-in-Charge, Government Marketing Depot.

The operations of the Government Marketing Depot during the year ended 31st December, 1933, being essentially of a business nature are best illustrated by the following tabular statement of the quantities and values of the various produce packed and marketed. The quantities shown do not include green limes exported to the United States of America or most of the exports to neighbouring West Indian Islands which are not packed by the Depot.

Produce.	*Size of Crate in cub. ft.*	*Packed, but not marketed by the Depot.*		*Packed & marketed by the Depot.*		*Total packed by the Depot.*	
		Quantity.	*Estimated f.o.b. value.* £ s. d.	*Quantity.*	*Estimated f.o.b. value.* £ s. d.	*Quantity.*	*Estimated f.o.b. value.* £ s. d.
Oranges ..	2	824	413 0 0	4597	2356 18 0	5421	2769 18 0
Grapefruit ..	2	1863	746 8 0	4201	1639 12 0	6064	2386 0 0
Green Limes ..	¾	5455	1091 0 0	698	139 12 0	6153	1230 12 0
Lemons ..	2	—	—	69	45 0 0	69	45 0 0
Tangerines ..	¾	—	—	25	6 5 0	25	6 5 0
Philippine Limes ..	2	25	10 0 0	10	3 16 0	35	13 16 0
Bears Seedless Limes ..	2	5	2 0 0	—	—	5	2 0 0
Mandarins ..	¾	—	—	4	1 0 0	4	1 0 0
Avocado Pears.	¾	2215	461 10 0	491	102 11 0	2706	564 1 0
Mangoes:							
Ordinary ..	2	1178	382 17 0	173	56 5 0	1351	439 2 0
Grafted ..	¾	226	50 17 0	193	43 8 0	419	94 5 0
Coconuts ..	bags	—	—	7	5 0 0	7	5 0 0
Pumpkins ..	brls.	—	—	2	1 10 0	2	1 10 0
Cabbages ..	,,	—	—	16	16 0 0	16	16 0 0
Totals ..		11791	3157 12 0	10486	4416 17 0	22277	7574 9 0

The exports of any one product are reduced to the most common pack, and the estimated f.o.b. value of fruit packed by the Depot, namely £7,574 shows an increase of £2,711 over the corresponding value for last year. The f.o.b. values are estimated by approximately averaging from account sales received up to the 31st December, and give the approximate weighted average f.o.b. values for each crop packed by the Depot for the year, and when compared with the corresponding total Packing House costs give the respective nett returns to the growers for the actual produce. These, for the principal crops, were as follows:—

Produce.	*Package volume in cub. ft.*	*Approximate average f.o.b. returns from account sales received.*	*Average Packing House Cost.*	*Average nett return to the grower.*
Oranges	2	10/3	3/2	7/1
Grapefruit..	2	7/11	3/2	4/9
Green Limes	¾	4/-	1/8	2/4
Mangoes :				
Grafted	¾	4/-	1/6	2/6
Ordinary	2	6/6	2/10	3/8
Avocado Pears	¾	4/2	1/5	2/9

Oranges and Grapefruit. Oranges and grapefruit exports for the years 1931, 1932 and 1933, showing distribution, are given below. The season usually extends from July to March and consequently fruit exports from parts of two seasons appear in the exports of a calendar year.

Year.	ORANGES. (*Crates.*)				
	Bermuda.	Canada.	United Kingdom.	British West Indies.	Total
1931 ..	596	1075	165	155	1991
1932 ..	772	2427	10	76	3285
1933 ..	1723	3633	6	59	5421

Year.	GRAPEFRUIT. (*Crates.*)				
	Bermuda.	Canada.	United Kingdom.	British West Indies.	Total.
1931 ..	107	127	—	12	246
1932 ..	202	2519	610	46	3377
1933 ..	161	3770	2104	29	6064

Limited shipments of oranges and grapefruit in January and February at the end of the 1932–33 season netted the growers 7/6 and 7/- per crate respectively.

During the summer about 850 crates of oranges were shipped to Bermuda and about 600 to Canada. This fruit, which was derived from a December-January bloom, netted the producer about 10/- and 6/3 per crate respectively.

The 1933–34 grapefruit and main orange crop started in September and from then to the 31st December the Depot packed for shipment 5,283 crates of grapefruit and 3,307 crates of oranges. The following table illustrates the substantial increase in exports for the season :—

Produce.	*1932–33 season. crates.*	*1932–33 season to end Dec. 1932. crates.*	*1933–34 season to end Dec 1933. crates.*
Oranges	3373	2779	4778
Grapefruit	3535	2754	5283

The grapefruit market in the Canadian Maritimes became glutted during the latter part of November. Growers therefore restricted shipments, and at the end of the year were holding over a quantity of fruit in cool-storage for a better market.

Shipments of grapefruit to the United Kingdom have increased this year owing to more regular shipping opportunities being available by the Leyland Line. The high sea-freight and marketing charges, particularly the former, have adversely affected sales to a considerable extent.

From account sales received to the 31st December, growers netted during 1933 an average of approximately 7/1 per crate of oranges and 4/9 a crate of grapefruit.

Green Limes. Shipments to Bermuda totalled 540 citrus crates in comparison with 307 crates last year.

Exports to Canada showed a marked increase during the year. The quantity shipped was 121 barrels together with the equivalent of 2,658 crates of ⅘ cu. ft. capacity as against 867 similar sized crates during the previous year. All of the barrelled fruit and 1,960 crates of ⅘ cu. ft. capacity, although packed by the Depot, were marketed by the producer. Shipments marketed by the Depot totalled 698 crates of ⅘ cu. ft. capacity and averaged a nett return to the producer of 2/4 per crate or approximately 16/- per barrel.

The export of limes to the United States of America totalled 4,204 barrels. These were all packed in private packing houses licenced for the purpose and inspected by Government Fruit Inspectors. Eight private lime packing houses were licenced during the year.

Lemons. Experimental work on lemon curing was carried out during the year. Fruit measuring 2¼ to 2½ inches in diameter was picked green and allowed to remain in cool-storage for about four weeks prior to packing for shipment. During this period it coloured appreciably, the juice content increased, and its flavour improved. Fruit cured in ordinary temperature shrivelled excessively. Small shipments of cured fruit sent to Canada in October netted the grower 5/- per citrus crate.

Avocado Pears. Shipments of pears to Bermuda starting in early July and continuing until late November, showed an increased export of fifty four per cent over last year. The average return to producers of 2/9 per crate of about 18 fruit was 3d. more than last year. A few experimental shipments of pears to Canada again proved unsuccessful, owing to rapid breakdown on arrival.

Ordinary Mangoes. Shipments of seedling mangoes to Bermuda began at the end of April and ceased towards the end of August, the total exports being 1,348 citrus crates as against 840 similar crates for the previous season. Returns for Depot shipments averaged 3/8 per crate nett (about 2/6 per 100 fruit,) which were satisfactory. The general average was, however, somewhat lower. Shipments in August had to be restricted owing to the prevalence of fruit fly damage.

Grafted Mangoes. Grafted mango exports amounted to 401 crates of ⅘ cu. ft. capacity, that is, 176 more than in 1932. Good prices were realised, growers averaging a return of 2/6 per crate of about 30 fruit.

Small shipments of grafted mangoes to Canada were continued with somewhat better results, satisfactory sales being obtained for the first time with shipments railed inland from the Maritimes. Much work has still to be done, however, to build up this market.

Peasants' Information Bureau. No peasants' produce was marketed overseas by the Bureau during the year, the peasants preferring to sell locally in view of the uncertainty of prices. Assistance was given in putting peasants in touch with buyers. Reports show-

ing local prices were circulated weekly for posting at country police stations and for publication in the local press.

Expenditure. Expenditure on the work of the Government Marketing Depot and Peasants' Information Bureau during the calendar year 1933 was classified under three Heads of Estimates and the following statement gives the expenditure under each head.

Government Marketing Depot.			
Personal Emoluments	£ 235 3 3		
Contingencies	18 7 6		
Trial Shipments of Fruit	21 12 1		
Equipment	23 1 9	£ 298 4 7	
Peasants' Information Bureau.			
Personal Emoluments	£ 200 0 0		
Rent of Shop	5 0 0		
Stationery and Printing	18 2 3		
Store and Office Equipment	1 0 0		
Contingencies	2 11 9		
Clerical Assistance and Wages of Staff.	50 6 0	£ 277 0 0	
Government Loans (Agricultural).			
Personal Emoluments		£ 165 3 0	
		£ 740 7 7	

Revenue was as follows :—

Inspection Fees and Packing House Receipts £497. 9. 6.

Government Marketing Depot Trading Advance Account. This account is utilised for the purpose of purchasing packing material and advancing local expenses on fruit packed by the Depot, and paying sea freight in some instances. The following statement shows the working of this account for the trading year ended 31st March, 1934.

Statement of the Government Marketing Depot Trading Advance Account for the year ended 31st March, 1934.

Cost of Packing Materials ..	£1,552 19 3	Receipts from Sales ..	£5,802 1 9
Cost of Packing	515 6 4	Receipts from Private Consignments ..	1,363 4 3
Cost of Shipping	1,066 0 5	Outstanding Expenses.	150 12 9½
Cost of Sea and Rail Freights and Marketing	1,850 0 2½		
Cost of Supervision	120 4 4		
Payments to Growers ..	2,211 8 3		
Totals ..	£7,315 18 9½		£7,315 18 9½

Cold Storage Fees. The Cold Storage and Ice Making Plant is operated and maintained by the Public Works Department, and fees collected for the precooling of fruit and vegetables for export amounted to £73. 7. 6.

Office Details. A new system of accounting has been brought into use which enables the books to be kept more on commercial lines.

Sixty-six separate consignments of fruit, involving 282 individual transactions with and on behalf of producers, were marketed. In addition, 159 consignments, involving 159 transactions, were prepared for private shippers.

The total number of letters despatched was 316.

Marketing Officer. My thanks are due to Mr. A. C. Shill, the Marketing Officer for the Leeward and Windward Islands, for his advice and assistance during the year.

EMIL TAYLOR,
Officer-in-Charge,
Government Marketing Depot.

Report of the Manager, Government Fruit Farm, Copt Hall.

Steady progress has been made in the development of the estate according to the approved plan. During the year 72 acres previously cleared and planted were maintained in clean condition and a further area of 15 acres was cleared. Thirteen and three-quarter acres, 6¼ of which had been cleared in 1932 were also planted with 673 miscellaneous citrus trees. To date there has been cleared an area of 96½ acres of which 84¾ acres have been planted with a total of 4,127 citrus trees. The major clearing operations have now been completed. This made it possible, during the latter half of the year, to give closer individual attention to the varying and different sections of the estate and to individual plants.

Further work was done on the construction of new paths and the improvement of existing ones, as well as the establishing of windbreaks and fences.

The estate is comprised of two main sections : viz., Demonstration and Estate Development, and consists of 19 plots of varying size.

Records are being kept of the details of expenditure on all the plots. From these, half-yearly analyses are prepared which show the expenditure on each detail of cultivation per tree.

Demonstration Plots. This section containing 7 plots of varying size is 20 acres in extent, 5 acres of which are being planted on similar lines to the Estate Development Plots, and cultivated as a model holding. The remaining plots are being used for citrus varietal and stock trials. During the year 55 citrus trees of different varieties were planted in this section, thus making a total of 889 trees planted to date. These include the following principal commercial varieties on sour orange, grapefruit and rough lemon stocks :—Grapefruit—Marsh, Duncan, Foster and Triumph ; Oranges—Washington Navel and Valencia. Plantings have also been made of the following varieties on sour orange stock only :—Pineapple, Jaffa and Portugal oranges ; King mandarin, Satsuma mandarin, Tangerine and Sweet Lime. These trials are intended to determine the most suitable varieties and stocks for use in localities where conditions are similar to those on this estate. Observations are also being made to detect the influence of these stocks on the different citrus varieties.

The position of these plots, situated as they are along the main road, renders them very suitable for the purpose of demonstrating general cultural operations and the utility of cover crops and mulch crops. The following cover crops are being grown :—*Tephrosia candida*, *Cajanus indicus*, *Indigofera endecaphylla*, *Canavalia ensiformis* and *Crotalaria striata*. Plantings of these legumes were extended as seed and cuttings became available during the year. Lemon grass and Guatemala grass are being grown to provide mulching material. Plantings of these grasses have also been extended.

The entire supply of material for planting this estate was obtained from trees selected for their bearing qualities. It is intended, when the trees come into bearing, to further select outstanding individuals from which budwood may be taken. Another purpose of these plots is, therefore, to supplement, and possibly replace, the Department's present supply of material for propagation.

A plot in this area is also devoted to lime breeding work. During the year original crosses mentioned in previous reports were maintained and some plants showing no sign of promise were removed. Preparation was also made for the planting out in 1934 of the back-crosses made in 1931.

Estate Development. This area contains 12 plots which vary in size from 5 to 10 acres. The scheme for planting these plots has been given in previous reports. During the year, 15 acres were cleared and holes prepared for planting. Of this area 7½ acres were planted with Marsh and Duncan varieties of grapefruit. A further area of 5¼ acres cleared in 1932 was also planted. In this section, therefore, a total of 12¾ acres were planted with 618 citrus trees. Seventy-six and a half acres have thus been cleared to date, of which

69¼ acres have been planted with 3,238 citrus trees. This completes the main clearing operations.

Routine work was carried out in all plots in this section and considerable expenditure has been incurred in the opening of new drains and deepening old ones where necessary.

Expenditure.

Personal Emoluments	£ 295	11	1
Annuity to previous owner	75	0	0
Livestock	19	7	9
Tools	10	19	3
Nursery & Demonstration Plots	310	16	6
Estate Development	389	14	9
	£1,101	9	4

Receipts.

Revenue derived chiefly from the sale of firewood and catch crops amounted to £7. 9. 10.

S. A. SCHOUTEN,
Assistant Agricultural Officer,
Manager Government Fruit Farm.

METEOROLOGICAL REGISTER KEPT AT BOTANIC GARDENS, DOMINICA.

Year. 1933.	Thermometer. Dry. 9 a.m.	Dry. 3 p.m.	Wet. 9 a.m.	Wet. 3 p.m.	Relative Humidity. 9 a.m.	Relative Humidity. 3 p.m.	Thermometer. Max'm.	Thermometer. Min'm.	Barometer Corrected. *Reduced to 32° Fh. Sea Level.* 9 a.m.	Barometer Corrected. *Reduced to 32° Fh. Sea Level.* 3 p.m.	Rainfall.	Barometer Corrected. Highest.	Barometer Corrected. Lowest.	Thermometer. Highest Maximum.	Thermometer. Lowest. Minimum.	Remarks.
January ...	75	79	72	73	81	74	82	69	30.00	29.91	7.30	30.07	29.83	86	66	
February ...	75	78	70	73	76	72	83	67	30.04	29.98	2.13	30.11	29.93	86	64	
March ...	79	83	72	73	69	58	87	70	30.01	29.94	2.37	30.08	29.83	90	66	
April ...	82	84	74	75	63	58	90	71	29.99	29.90	2.03	30.04	29.82	92	67	
May ...	83	85	76	75	66	60	90	73	29.98	29.96	2.26	30.03	29.86	94	70	
June ...	84	85	76	76	66	63	90	73	29.96	29.91	7.05	30.00	29.85	96	71	
July ...	82	84	77	78	74	74	88	74	29.96	29.93	12.30	30.03	29.82	92	72	
August ...	82	84	77	77	74	67	89	74	29.96	29.90	7.94	30.04	29.83	91	72	
September ...	81	83	76	76	75	70	87	74	29.93	29.86	11.51	30.00	29.84	92	70	
October ...	82	82	76	76	71	72	87	73	29.90	29.83	9.26	29.96	29.76	90	71	
November ...	79	80	73	74	80	74	84	72	29.91	29.83	11.04	30.00	29.76	90	70	
December ...	77	85	72	74	72	74	83	70	29.98	29.90	7.03	30.08	29.84	87	68	
Year ...	80	83	74	75	72	68	87	72	29.97	29.90	82.22					

Highest Maximum Temperature = 96° on June 15th. Lowest Minimum Temperature = 64° on February 25th.
,, Barometer (Corrected) = 30.11 ,, February 14th. ,, Barometer (Corrected) = 29.76 ,, October 30th.
Greatest Rainfall in 24 hours = 3.76 ,, June 28th.

RAINFALL AT THE BOTANIC GARDENS, DOMINICA, 1914–1933.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	Monthly Mean Rainfall.
January ...	3·22	1·76	10·79	5·00	6·02	2·42	7·54	6·82	6·50	3·82	6·25	7·88	3·68	5·50	6·60	5·18	10·65	1·47	5·47	7·30	5·69
February ..	5·56	1·04	1·90	4·10	8·73	1·52	4·76	1 02	4·30	2·30	1·90	1·95	2·46	4·50	4·25	3·13	2·07	1·05	1·57	2·13	3·01
March ...	2·23	0·84	4·52	6·74	3·32	0·69	3·80	4·46	2·80	3·46	0·66	3·50	·96	5·37	6·30	7·36	3·89	·59	1·56	2·37	3·27
April ...	6·45	15·75	1·22	0·47	1·86	2·36	·22	3·06	2·26	3·77	1·46	·40	2·77	4·67	4·16	1·27	5·01	·51	2·33	2·03	3·10
May ...	2·58	3·65	2·05	2·94	5·90	4·60	2·38	1·54	2·64	0·13	3·18	2·76	2·44	6·69	2·25	2·80	2·21	1·70	5·07	2·26	2·98
June ...	7·27	9·17	4·82	15·34	6·04	3·88	3·48	1·96	7·14	4·18	4·42	5·80	5·76	15·03	6·68	10·87	7·32	9·98	10·72	7·05	7·34
July ...	11·83	14·84	8·23	13·70	11·28	12·64	12·08	11·18	6·08	8 20	13·64	6·23	10·14	9·61	6 58	13·13	7·90	18 45	8·05	12·30	10·80
August ...	3 98	14·74	16·58	8·53	8·46	9·64	8·73	9·30	9·26	11·44	11·28	13·88	10·10	4·65	12·80	12·55	6·76	17·44	7·23	7·94	10·26
September.	7·71	11·36	6·20	15 02	4·14	7·06	8·60	6·28	10·68	4·28	4·88	9·12	4·12	6·20	8·10	5·63	14·66	13·51	6·13	11.51	8·25
October ...	5·13	8·41	10·06	2·46	6·67	7·50	12·60	9·41	2·68	9·84	10·98	12·55	5·86	8·84	4·35	12·19	3·15	9·71	6·72	9·26	7·91
November.	9·44	10·05	14·28	1·92	3·36	9·02	4·62	2 44	3·00	1·06	6·86	9·60	7·54	8·70	7·93	14·39	5·51	11·90	13·83	11.04	7·82
December .	9·70	8·40	3·77	4·58	5·86	6·70	5·62	4·22	6·90	1·92	13·65	2·02	3·75	1·37	5·38	8·48	3·66	7·56	5·21	7·03	5·78
Total ...	75·10	100·01	83·42	80·80	71·46	68·03	74·46	61·72	64·24	54·40	79·16	75·69	59·58	81·13	75·38	96·98	72·79	93·87	73·89	82·22	– –

Average year = 76·21 inches.

RAINFALL RETURNS, DOMINICA, 1933.

STATIONS.		JAN	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER	NOV.	DEC.	TOTALS.
1. Batalie	L ...	3.54	1.07	.59	1.30	1.46	5.71	10.17	9.06	8.62	9.64	4.60	3.48	59.24
2. Botanic Gardens	L ...	7.30	2.13	2.37	2.03	2.26	7.05	12.30	7.94	11.51	9.26	11.04	7.03	82.22
3. Blenheim	LAS.	6.15	3.27	5.02	10.14	6.43	14.16	12.32	9.86	14.81	10.71	14.49	10.02	117.38
4. Canefield	L ...	6.61	.86	2.47	2.28	2.60	7.27	15.09	9.80	12.19	7 55	9.43	5.27	81.42
5. Cabrits	L ...	6.00	3.82	3.00	3.21	3.90	9.08	12.38	4.85	9.75	6.78	7.37	7.82	77.96
6. Clark Hall	L ...	8.60	2.58	3.32	4.33	4.30	12.61	19.15	11.34	19.30	8.92	10.82	11.88	117.15
7. Copt Hall	L ...	15.76	3.50	5.32	3.78	5.93	11.70	17.82	17.21	19.20	11.64	17.26	13.06	142.18
8. Fond Hunt	I ...	29.05	9.73	11.54	6.05	14.12	16.02	34.45	14.43	22.61	18.11	17.30	19.93	213.34
9. Governor	W ...	9.00	3.40	5.18	9.84	11.68	17.97	16 53	12.48	24.12	18.31	22.29	8.81	159.61
10. Hampstead	LAS.	3.80	3.60	4.15	7.40	8.00	12.05	16.60	6.18	17.18	11.62	15.22	7.78	113.58
11. Morne Bruce	L ...	8.87	2.66	2.94	2.49	2.97	7.79	12 95	8.55	12.76	9.83	12.58	7.79	92.36
12. Picard	L ...	8.79	3.72	3.30	3.71	6.04	9.27	10.90	10.23	13.91	6.47	8.86	8.23	93.43
13. Pte. Mulâtre	W ...	5.25	2.87	4.48	6.50	5.37	18.24	11.22	11.84	19.94	14.23	19.80	6.55	126.29
14. Rosalie	W ...	7.68	2.21	3.59	7.49	15.35	17.20	12.53	11.88	25.20	19.81	27.83	8.52	159.29
15. Ridgefield	L ...	15.73	4.68	4.86	5.21	5.29	4.56	14.92	13.97	18.09	11.66	17.08	13.65	139.70
16. Shawford	I ...	18.84	9.04	12.82	8.60	16.72	19.06	22.83	35.33	28.43	21.56	30.76	33.62	257.61
17. Sherwood	I ...	24.72	6.88	7.77	10.15	12.59	20.20	20.10	18.44	23.17	15.57	18.15	16.17	193.91
18. Stowe	W ...	7.40	4.19	4.56	5.25	9.44	17.01	11.88	15.28	15.00	17.07	15.82	10.19	133.09

Mean Rainfall 18 Stations ... ... 131.12 inches.
,, ,, 9 Leeward Stations... ... 98.41 ,,
,, ,, 4 Windward ,, ... 144.57 ,,
,, ,, 3 Inland ,, ... 221.62 ,,
,, ,, 2 Lasoye ,, ... 115.48 ,,

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